REMARKS

Claims 1-10 are pending in the present application. Claims 1-7 are rejected. Claims 1 and 2 are herein amended. No new matter has been presented.

The grounds for new claim 1 are described in the original claim 2, specification page 6, line 35 to page 7, line 5 and page 7, lines 9-11,

It is mentioned on page 6, line 35 to page 7, line 5 that a filling factor of the pressure-sensitive adhesive layer in the groove is preferably 50% or more; and also mentioned on page 7, lines 9-11 that when the filling factor is 50% or larger, air between the retroreflective sheet and the substrate can be exhaled sufficiently at the time of the adhesion of the retroreflective sheet to the substrate.

Further, the grounds for new claim 2 are described in specification page 7, lines 6-11, Table 1 on page 33, and on page 33, line 5 to page 34, line 8.

The specification on page 7, lines 6-11 indicates that the filling factor is more preferably 70% or larger; and also it is also described in Table 1 in specification page 33 and specification page 33, line 6 to page 34, line 8 that, as a more preferable example, the filling factors of Examples 1 to 4 are in a range of C (from 70 to 100%).

Claim Rejections - 35 U.S.C. §103(a)

Claims 1-7 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tolliver et al. (U.S. Patent No. 5,069,964) in view of Buccellato et al. (U.S. Patent Application Publication No. 2002/004135).

Claims 8-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tolliver in view of Buccellato as applied above, and further in view of Ojeda et al. (U.S. Patent No. 6,326,072).

Applicant herein amends the claims to clarify the invention. Thereafter, Applicant respectfully disagrees with the rejection, and submits that the claimed invention is neither taught nor suggested by the cited references, alone or in combination.

In claim 1 as presently amended, the filling factor of the pressure-sensitive adhesive layer in the groove is clearly defined as 50% or more.

Further, in new claim 2, the filling factor of the pressure-sensitive adhesive layer is in a more preferable range of 70% or more.

The present invention refers to a retroreflective sheet having a groove of the connection part formed on the rear face side, similarly to the Tolliver reference. It further includes a pressure-sensitive adhesive layer on the rear face side, and is adhered to a substrate of aluminum or the like so as to be used as a display board or a signboard. Applicant notes specification page 1, lines 10-37.

When air is enclosed during adhesion of the retroreflective sheet to the substrate, the enclosed air expands and problems such as blisters, bubbles, wrinkles and exfoliations may occur to the retroreflective sheet. When adhering while applying some pressure so as to expel the trapped air in order to prevent the problems, if the retroreflective sheet is adhered in a distorted state, problems such as blisters, bubbles, wrinkles, exfoliations or the like occur in the

retroreflective sheet due to a residual stress inside the retroreflective sheet. Applicant notes the specification page 2, lines 1-13.

However, when the cohesive power of the pressure-sensitive adhesive is lowered to allow the pressure-sensitive adhesive laver to enter the groove easily, cohesive failure of the pressure-sensitive adhesive may be caused since it cannot resist the stress remaining in the inside of the retroreflective sheet, so that a similar trouble may occur. Applicant notes the specification page 2, line 29 to page 3, line 13.

Further, when the cohesive power is too high as in the pressure-sensitive adhesives of the cited JP 3278299 and Comparative examples 1 and 3, the groove cannot be filled sufficiently with the pressure-sensitive adhesive, and the internal stress is not relaxed by the pressure-sensitive adhesive laver. As a result, wrinkles, blisters, bubbles, exfoliations and the like may occur to the main body of the retroreflective sheet. Applicant notes the specification page 2, lines 16-28, Comparative Examples 1 and 3, Tables 1 and 2.

The pressure-sensitive adhesive layer of the present invention is characterized in that, "the groove is filled with the pressure-sensitive adhesive layer by 50% or more in advance, a residual rate of the pressure-sensitive adhesive layer ranges between 10% and 50% inclusive, a fall time of the pressure-sensitive adhesive layer ranges between 10 hours and 150 hours inclusive, and the pressure-sensitive adhesive layer is formed of a rubber-based resin or an acrylic resin", as noted in claim 1.

That is, the Inventors have found that air between the retroreflective sheet and the substrate can be exhaled sufficiently at the time of the adhesion of the retroreflective sheet to the substrate by (1) filling a groove formed during heat press emboss forming, with a pressure-sensitive adhesive laver by 50% or more in advance for reducing the air existing in the groove in advance; and the residual stress in the retroreflective sheet after the adhesion can be relaxed by (2) specifying a residual rate of the pressure-sensitive adhesive layer in a specific and (3) specifying a fall time of the pressure-sensitive adhesive layer in a specific range, thereby leading to the present invention. Applicant notes the specification page 6, lines 9-17 and page 7, lines 9-11.

In order to fill the groove with the pressure-sensitive adhesive laver by 50% or more in advance it is required to specify the **residual rate** and **fall time of the pressure-sensitive adhesive layer** in specific ranges so that the cohesive power does not become too high.

The residual rate of the present invention represents a stress relaxation property of the pressure-sensitive adhesive layer. When the residual rate is in the specific range between 10% and 50% inclusive, a residual internal stress in the retroreflective sheet is relaxed by the pressure-sensitive adhesive laver, thus preventing an appearance abnormality that occurs over the course of time, such as wrinkles, blisters, bubbles and exfoliations. Applicant notes the page 7, lines 12-21.

Further, the fall time of the present invention represents a cohesive power of the pressure-sensitive adhesive layer. When the fall time is 10 hours or longer, the cohesive power of the pressure-sensitive adhesive layer is strong enough **to** resist a shrinkage stress of the

retroreflective sheet, so that the retroreflective sheet is not shrunk. Moreover, when the fall time is 150 hours or shorter, since the cohesive power of the pressure-sensitive adhesive is not too high, a residual internal stress in the retroreflective sheet is relaxed by the pressure sensitive-adhesive laver, thus preventing an appearance abnormality such as wrinkles, blisters, bubbles and exfoliations. Applicant notes the specification page 7, lines 22-36.

Buccellato et al. shows in its Fig. 1 an example of pavement marking articles, and the pressure-sensitive adhesive layer is disposed on a surface of a bottom flat layer. In Buccellato et al., there is no description or suggestion about filling the groove with a part of the pressure-sensitive adhesive layer by 50% or more.

Further in Buccellato et al., there is no description or suggestion about solving problems such as wrinkles, blisters and the like that occur at the time of adhesion on a retroreflective sheet having a groove on the rear face side.

Further, the pressure-sensitive adhesive layer of Buccellato et al. is considered as having a high loss shear modulus and high storage shear modulus under impact conditions and has better weatherability. However, as in the cited JP 3278299 and Comparative Examples 1 and 3 of the present invention, when the cohesive power is too high, the groove cannot be filled sufficiently with the pressure-sensitive adhesive, and the internal stress is not relaxed by the pressure-sensitive adhesive laver. As a result, wrinkles, blisters, bubbles, exfoliations and the like may occur to the main body of the retroreflective sheet.

The pressure-sensitive adhesive layer of Buccellato et al. is used for a pavement marking article to be adhered on the road surface, and hence the pressure-sensitive adhesive layer as well as the surface of the article itself is required to have high impact resistance under impact conditions applied by tires of vehicles or the like.

On the other hand, capsule type retroreflective sheets of the present invention and Tolliver et al. are formed with a groove of the connection part on the rear face side, and further, include an air layer sealed by the connection part. Applicant notes Figs. 1 to 6 of Tolliver et al. and Figs. 7 to 10 of the present invention. When such a capsule type reflective sheet is used under impact conditions applied by tires of vehicles or the like, the air layer is highly likely to be destroyed. Therefore, it is difficult to use the capsule type retroreflective sheet for the pavement marking of Buccellato et al.

Further, in Tolliver et al. there is no description or suggestion about the problems to be solved in the present invention, the filling factor of the groove, and the relationship between the residual rate and the fall time of the pressure-sensitive adhesive layer.

Furthermore, in Tolliver et al., there is no description or suggestion about solving these problems by using a pressure-sensitive adhesive having a residual rate and a fall time within the ranges of the present invention and filling the groove with a part of the pressure-sensitive adhesive layer by 50% or more.

Therefore, the present invention would not have been obvious over Tolliver et al. and Buccellato et al.

Further, for the same reasons as mentioned previously, the properties of the present invention are not inherent to the pressure-sensitive adhesive layer of Buccellato et al.

In view of the aforementioned amendments and accompanying remarks, Applicant submits that the claims, as herein amended, are in condition for allowance. Applicant requests such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact the undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely, Applicant petitions for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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